
ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER VII

**NOISE,
LIGHT
POLLUTION,
AND VISUAL
POLLUTION**

VII. NOISE, LIGHT POLLUTION, AND VISUAL POLLUTION

A. NOISE

1. Overview

Noise is, by definition, any undesired sound. Noise is sound at the wrong time and in the wrong place. It has been called the "most impertinent of all form of interruption." The multiple and insidious ill effects of noise constitute an inadequately recognized, baneful influence on the lives of millions of Americans. It disrupts daily activities as well as peace and quiet, and it is as much a form of pollution as air or water pollution. In 1966, the World Health Organization declared noise to be a significant health threat. Although permanent hearing loss is the most obvious noise-related health issue, exposure to noise can cause many other health problems. Exposure to excessive noise levels can cause psychological and physiological damage leading to stress, high blood pressure, sleeplessness, distraction, and lowered work productivity. Noise levels need not be excessive to cause such havoc. Sustained noise at any level may result in physiological changes in sleep, blood pressure, and digestion.

Noise can even affect social behavior and cognitive development. Recent studies by Cornell University examining the impact of aircraft noise on children's health found higher systolic and diastolic pressure in children living near Los Angeles Airport when compared to those living farther away. A 1995 study by the University of London found relationship between chronic noise exposure and elevated neuroendocrine and cardiovascular measures for children living near Munich International Airport. A 1997 study found that children exposed to chronic airport noise lag behind in reading ability, cognition, and language acquisition skills.

Government studies have pointed out the most frequent complaint Americans have about their neighborhood is not crime but noise. Nevertheless, the two largest sources of noise pollution -- airport noise and vehicular traffic noise, are growing at a rate of three to five percent annually. One need only to check the Noise Pollution Clearinghouse web site (www.nonoise.org) to view thousands of news stories dealing with lawsuits and community battles over noise. As technology and population continue to grow, one can assume that noise-related controversies will only increase.

2. Noise Measurement

Noise is expressed in decibels (dB), the basic unit for the measurement of sound. Sound itself is molecular waves caused by an object in motion that forms vibrations that travel

through a medium such as air. The human ear only hears sound waves between certain frequencies (the number of time per second the sine wave of sound repeats itself or that the sine wave of a vibrating object repeats itself). Because the ear has a different sensitivity to noise sources than a microphone, a logarithmic weighting curve, the A-weighting scale, has been developed for use in approximating the sensitivity of the average human ear's perception of loudness. Therefore, noise levels related to human impacts are measured and expressed in terms of A-weighted decibels (dBA). Some examples of noise levels are:

Threshold of pain	130 decibels
Riveting on steel plate at 6 feet	120 decibels (deafening)
Noisy urban street	90 decibels (very loud)
Continuous exposure likely to degrade hearing	80 decibels
Auto at 50 feet at 50 mph	70 decibels (loud)
Average office	50 decibels (moderate)
Quiet living room	20 decibels (faint)

To assist in the assessment of noise levels most representative of particular noise sources and environments, various government agencies and localities have developed measurement scales or noise descriptors for averaging, calculating, and representing noise levels. To simplify the noise-measuring task, federal government scientists created the Leq equivalent noise levels for a given period. The Leq basically takes each noise event and devolves it into a one-second event with appropriate amplitude. All these one-second events during the day (24 hours) are then summed up to create an average for the day. However, because of the greater impact that noise has during evening hours, a 10 dB penalty to the Leq is applied to the nighttime hours from 10 p.m. to 7 a.m. The measurement is the basic level used in Fairfax County for land use planning purposes. This is referred to as the Day-Night Average Sound Level or DNL. California and some European countries use a Community Noise Equivalent Level (CNEL) which includes a 5 dBA penalty during the hours of 7 p.m. to 10 p.m. in addition to the 10 dB DNL nighttime penalty as a recognition of the importance of communication and relaxation during evening hours.

Because noise-level scales are logarithmic, values cannot be directly added to each other to calculate a total combined noise level. Two noise sources producing equal sound levels at a given location will produce a composite sound level that is 3 dBA greater than either sound alone. Thus, a doubling in the noise level will equate to an increase of 3 dBA. When two values differ by 10 dBA, the composite noise level will be only 0.4 dBA greater than that of the louder noise source alone.

Because noise consists of sound waves traveling through the air, noise levels decrease with distance from the noise source. With no intervening obstruction, noise will

decrease approximately 6 dBA for every doubling of distance away from the source. However, when the noise source is essentially a continuous line, such as vehicle traffic on a highway, noise levels generally will decrease about 3 dBA for every doubling of distance.

When intervening land or structural features are present with a distance between a noise source and a receptor, noise values can be affected by these features. If intervening ground is covered with noise absorption materials, such tall grasses, shrubs, or trees, the reduction in noise levels will be somewhat greater than the 3 dBA value noted above for traffic noise. Structural barriers and geographic features can cause sound waves to be absorbed or to bounce and reflect in different directions, thereby affecting the noise at a particular receptor. Atmospheric conditions can also affect the degree to which sound is reduced over distance.

Several federal and state agencies have developed guidelines for evaluating land use compatibility for applicable noise level ranges, based on characteristics of noise sources and receptors. The Federal Noise Control Act of 1972 established a requirement that all federal agencies develop programs to promote an environment free of noise that threatens public health or welfare. Although the Environmental Protection Agency (EPA) has responsibility under the act, each federal agency has the authority to adopt noise regulations pertaining to that particular agency's activities, e.g., the Federal Highway Administration sets noise standards for federally funded transportation projects while the Federal Aviation Administration (FAA) sets aircraft noise standards.

An important element of the Federal Noise Control Act is that it directs all federal agencies to comply with applicable federal, interstate, state, and local noise control regulations. Many states have guidelines and standards for evaluating noise impacts and requirements to incorporate mitigation measures into proposed projects or actions. Municipalities also establish local noise guidelines, usually within the framework of a comprehensive plan through noise-related ordinances. The Fairfax County Comprehensive Plan establishes noise-related goals and policies, and describes the general noise environment. The County also has a noise ordinance with recommends maximum expected noise levels for various land use categories.

3. Emerging Issues

a. The Potomac Consolidated TRACON Project

The FAA decided to streamline its current operations in the Potomac region by consolidating four Terminal Radar Approach Control (TRACON) facilities into a single integrated operation. Ground was broken for the new installation on March 6, 2000. This new integrated TRACON is at Vint Hill, Fauquier County (near

Warrenton, Virginia). Construction is expected to be complete in 2001 and facility commissioning is expected in 2002.

TRACON facilities are radar air traffic control facilities that control air traffic from about five to fifty miles out from airports. By replacing the existing four TRACON facilities, the FAA argues that they can simplify operations and reduce cost -- including the better management and control of airspace. The FAA, in implementing this project, is using a two-tiered approach to the Environmental Impact Statement (EIS). The first phase is the actual construction of the Fauquier County facility. The final EIS for this first tier was issued in April 1999 with the finding that the proposed actions were consistent with existing national environmental policies and objectives.

The second phase of the TRACON project focuses on the actual redesign of the airspace that will be controlled by the Vint Hill facility. The FAA has stated that such a redesign would benefit the region by allowing both arriving and departing flights to stay at higher altitudes for longer periods of time. The use of higher altitudes for longer periods of time will reduce overall aircraft noise as well as the length of time the noise can be heard. A draft EIS for this second phase is expected in 2001.

Because of the potential impact on Fairfax County citizen's and their exposure to aircraft noise, Fairfax County needs to study the EIS when issued and provide comments.

b. Helicopter Noise

A meeting of the Helicopter Noise Working Group, under the aegis of the Committee on Noise Abatement at National and Dulles Airports (CONANDA, a committee of the Metropolitan Washington Council of Governments), took place on March 1, 2000. Items discussed included a pending MOU between the Army, Navy, Air Force, and Marines that dealt with flight patterns in southwest Washington, near Haines Point. Language in the MOU states that moving the flight pattern away from the neighborhood would significantly help the community. Next steps in addressing helicopter noise include the mapping of hot spots -- high complaint areas identified by citizens due to helicopters. Subsequent meeting of this Working group continued to address hot spots, including using GIS to map these areas of high citizen complaints.

c. W. H. Ford Aviation Investment and Reform Act of the 21st Century (AIR 21)

As reported in last year's Annual Report on the Environment, Congress passed AIR 21. This resulted in the creation of 24 new slots at Reagan National Airport. Twelve of these are for flights inside the 1,250 mile perimeter and the other twelve are for flights outside (i.e., greater than) the 1,250 mile perimeter.

d. Federal Aviation Regulation (FAR) Part 150

Part 150 is an FAA program that makes grant money available to airport proprietors to undertake noise and land use compatibility planning. The Metropolitan Washington Airports Authority (MWAA) has initiated a major update of the Noise Compatibility Study for Ronald Reagan Washington National Airport in accordance with the provisions of FAR Part 150. The purpose of this study is to forecast future noise contours at Reagan National and propose abatement actions to mitigate community noise impacts. CONANDA will be working with MWAA throughout the Part 150 study process. The study started the first quarter of 2001 and the process is anticipated to take 18 months.

The Metropolitan Washington Council of Governments (COG) sent a letter to the Fairfax County Board of Supervisors inviting the Board's participation in a Part 150 Advisory Committee. In response, on June 11, 2001, the Board appointed Supervisor Hyland as the Board's representative on this committee and Supervisor Mendelsohn as the alternate.

4. Highway Noise

a. Background

Traffic in the Washington metropolitan area, including Fairfax County, continues to grow with intense residential development in Loudoun and Prince William Counties. The area has ranked second nationally for the worst commuting times behind Los Angeles. As more lanes are added and some new roads are constructed, increased traffic generates more noise that creates demands for noise attenuation or abatement measures. These measures include separating the receiver from the source by distance, constructing barriers/walls or berms, providing landscaping/vegetation, or providing acoustical design solutions. Barriers are the most popular choice. Since 1991, barriers constructed in Fairfax County by the Virginia Department of Transportation have consisted of solid walls of absorptive concrete that, at a minimum, break the lines of sight between vehicles and homes. Although noise barriers have a maximum decibel reduction of 20 decibels, most only provide 10-12 decibel reductions.

b. State Policy

Virginia adopted its original noise abatement policy in 1989. The policy established criteria for providing noise protection in conjunction with proposed highway projects in the State. Implementation of the policy has aided in the construction of, or construction approval for, more than 100 federally-funded sound barriers. Experience with this policy created considerable feedback from citizens and elected officials. As a result, the Commonwealth Transportation Board decided to evaluate the policy for possible changes. The major source of information used was a survey of 15 State Departments of Transportation in the eastern U.S. The culmination of this process was the adoption of changes to the State policy in November, 1996, which became effective in January, 1997.

The key changes to the policy were to: 1) raise the cost-effectiveness ceiling from \$20,000 per protected receptor to \$30,000 per protected residential property based on other state practices; 2) clarify that Virginia will not participate in any retrofit project along an existing highway when not in conjunction with an improvement for that highway; and 3) add the possibility for third party funding of the amount above the Virginia Department of Transportation's (VDOT's) \$30,000 ceiling if the abatement measure otherwise satisfies the criteria.

c. State Projects in Fairfax County

VDOT's Northern Virginia Office constructed the following sound barriers in FY 00-01:

- Roberts Parkway, Route 6197, one barrier
- Route 28/29 Interchange – between I-66 and Route 28/29 Interchange – construction of 2 barriers
- Springfield Interchange (I95/395/495) – construction of up to 5 barriers
- Baron Cameron Avenue Interchange with Fairfax County – construction of 3 barriers

The following barriers have been approved and construction is anticipated to begin on them in FY 01-02:

- Springfield Interchange (I95/395/495) – barriers not completed in 00-01
- West Ox Road, Route 608, one barrier

d. County Practices and Projects

In Fairfax County's *Policy Plan: The Countywide Policy Element of the Comprehensive Plan* (2000 Edition), there is an objective to "minimize human exposure to unhealthful levels of transportation generated noise." It states that new development should not expose residents in their homes to noise in excess of DNL 45 dBA. Because typical residential building materials will reduce noise levels by at least 20 dBA, mitigation is recommended when highway noise is between DNL 65 and 75 dBA. In areas with highway noise exposures exceeding DNL 75 dBA, residential development should not take place.

B. LIGHT POLLUTION

1. Overview

Light pollution, as briefly discussed in earlier EQAC Annual Reports on the Environment, is a general term used to describe light output primarily from exterior (outdoor) sources in commercial, residential, and roadway settings that is excessive in amount and/or that causes harmful glare to be directed into residential neighborhoods or into the path of travel. Light pollution is thus both a safety issue and a quality of life issue. With the increasing urbanization of Fairfax County, exterior (outdoor) lighting and light pollution in its many forms have become pressing issues to our communities. At present, Fairfax County has some regulations regarding exterior lighting, but they are minimal and out of date, since they do not take into account the numerous major advances that have been made in lighting technology in recent years. However, the County is currently drafting a comprehensive ordinance that should materially improve our posture in this area.

2. Issues and Problems

The main issues and problems of exterior lighting and light pollution may be summarized as follows:

a. Glare

Glare, as defined by the Illuminating Engineering Society of North America (IESNA), falls into three main categories:

- i. Disability glare – Disability glare, also known as veiling luminance, is caused by light sources that shine directly into one's eyes and is dangerous because it is blinding.

- ii. Discomfort glare – Discomfort glare does not necessarily reduce the ability to see an object, but it produces a sensation of discomfort due to high contrast or non-uniform distribution of light in the field of view.
- iii. Nuisance or annoyance glare – Nuisance glare is that which causes complaints such as: “The light is shining in my window.”

Glare is a significant and pervasive problem that seriously impairs both safety and quality of life. Glare demands attention in that one’s eyes are naturally attracted to bright light, and at night this destroys the eye’s dark adaptation, which is a serious driving hazard. Obtrusive lighting by commercial establishments to attract attention is a serious problem, as is selection of inappropriate fixtures for exterior residential lighting. Glare and excessive illumination cast into surrounding residential neighborhoods not only detracts from the quality of life but can make it difficult for pedestrians and homeowners to see their surroundings.

b. Light trespass

Light-trespass is the poor control of outdoor lighting such that it crosses property lines and detracts from the property value and quality of life of those whose property is so invaded. It is particularly common where obtrusive commercial lighting is immediately adjacent to residential neighborhoods or when a homeowner uses inappropriate fixtures, light levels, and lighting duration, often in the interest of “security.” It is generally categorized in two forms:

- i. Adjacent property is illuminated by unwanted light.
- ii. Excessive brightness occurs in the normal field of view.

Both of these forms may be present in a given situation.

c. Security

Much outdoor lighting is used to provide security. These safety concerns often result in bad lighting rather than real security. One reason often cited for today's bright lights is that high wattage is needed to deter crime. If light is overly bright with excessive glare, it makes it easier for a person to hide in the deep shadows created by objects in the harsh glaring light. This might actually encourage crime rather than discouraging it. The debate as to whether or not additional light provides more safety has been more emotional than factual. Those rigorous studies that have been done reveal no connection between higher lighting levels and lower crime rates. This may be due to people with nefarious intent taking more risks in better lit

areas. For example, the National Institute of Law Enforcement and Criminal Justice found no statistically significant evidence that lighting impacts the level of crime (Upgren, 1996). Thus, the correlation between security lights and reduced crime appears to be nothing more than a popular myth.

d. Urban sky glow

Urban sky glow is brightening of the night sky due to manmade lighting that passes upward with the light rays reflected off of submicroscopic dust and water particles in the atmosphere. Although urban sky glow was first noted as a problem by the astronomical community, it is by no means any longer solely an astronomical issue. With the increasing urbanization of many areas of the U.S., all citizens in those areas are now being affected. In Fairfax County, which is now an urban county, improper lighting has seriously degraded the darkness of our local night skies into a pallid luminescence that many of our citizens find objectionable.

e. Energy usage

Smart lighting techniques reduce energy consumption and hence the use of fossil fuels. Several engineering estimates suggest that at least 30 percent of outdoor lighting is being wasted through spilling upward and outward rather than being directed downward onto the target area. Also, many installations are greatly over-illuminated as well as being lighted for unnecessary durations, further compounding the energy wastage. Inefficient lighting incurs both direct financial costs and hidden environmental costs. It has been estimated by national organizations studying light pollution that in excess of \$8 billion of electricity is being wasted annually on obtrusive and inefficient outdoor lighting (see data from Virginia Outdoor Lighting Task Force and the International Dark-Sky Association). Since electricity generation in the eastern part of this country is almost entirely from fossil fuels, every unnecessary kilowatt of electrical energy generated also produces unnecessary greenhouse gases and acid rain.

3. Current County Standards and Regulations

Fairfax County does prescribe limits for the maximum wattage of light sources and for the amount of glare in residential districts. However, these standards do not cover all roadways (particularly main roadways, which are under the jurisdiction of the Virginia Department of Transportation (VDOT)), nor is there any policy regarding residential street lighting. Additionally, the combined effects of glare into residential neighborhoods from sources such as park lights and lights on nearby commercial buildings are not fully addressed.

Fairfax County's *Policy Plan: The Countywide Policy Element of the Comprehensive Plan* (2000 Edition) recognizes the nuisance of light emissions arising from increasing urbanization and recommends that efforts be made to avoid creating sources of glare that interfere with residents' and/or travelers' visual acuity. To put this into practice, the current County Zoning Ordinance lists glare standards. Specifically, it requires that illumination shall not produce glare in residential districts in excess of 0.5 foot candles and that flickering or bright sources of light shall avoid being a nuisance in residential districts. It also prescribes limits for the maximum intensity of light sources as follows:

SOURCE	INTENSITY	
	Group I	Group II
Bare incandescent bulbs	15 watts	40 watts
Illuminated buildings	15 foot candles	30 foot candles
Back lighted or luminous background signs	150 foot lamberts	250 foot lamberts

Group I applies to all residential zoning as well as commercial districts 1 through 4 and industrial districts 1 through 4. Group II is limited to commercial districts 5 through 8 and industrial districts 5 and 6.

4. Addressing the Problem

One of the most common street lights in use, the cobra-head fixture, draws 150 watts. A fixture with reflective backing and shielding can direct all light below the horizontal plane with the same illumination of streets and homes and use only 100 watts. The same possibility exists with the popular 175 watt unshielded mercury vapor lamp. Both the 150-watt cobra-head fixture and the 175-watt mercury vapor lamp cast light laterally as well as down. As a result, substantial glare is often cast directly into the eyes of drivers. This glare destroys drivers' dark adaptation, creating potential safety hazards. In many cases the driver is not able to see the roadway any better than he or she would with lower-wattage properly shielded lights, and in many cases his or her vision is much worse. Because they cut down on glare, shielded fixtures not only are safer for drivers, but according to experts (see references) actually make it easier for pedestrians and home owners to see their surroundings.

By redirecting this wasted energy, lower wattage lights provide the same amount of illumination in the areas where it is needed. These fixtures have reflective backing and full cut-off shielding to direct all light below the horizontal plane, with 90 percent of the light directed below an angle of 20 degrees from the horizontal. For example, a 50-watt metal halide lamp with a reflective shield will provide as much illumination below the horizontal plane as the 150-watt cobra-head fixture or the 175-watt unshielded mercury

vapor lamp. These newer types of fixtures, which are recommended by the Illuminating Engineering Society of North America, are widely available and direct all light below the horizontal plane, thereby eliminating lateral glare (see Figure VII-1). It is estimated that it takes only three years of energy savings to recoup the initial investment in these fixtures. The lower wattage fixtures provide energy savings, improved driver safety, better visibility for pedestrians, and an improved ambiance and security for neighborhoods. Several municipalities, such as Tucson, San Diego, and Sanibel Island, Florida, have adopted street lighting ordinances requiring these newer fixtures.

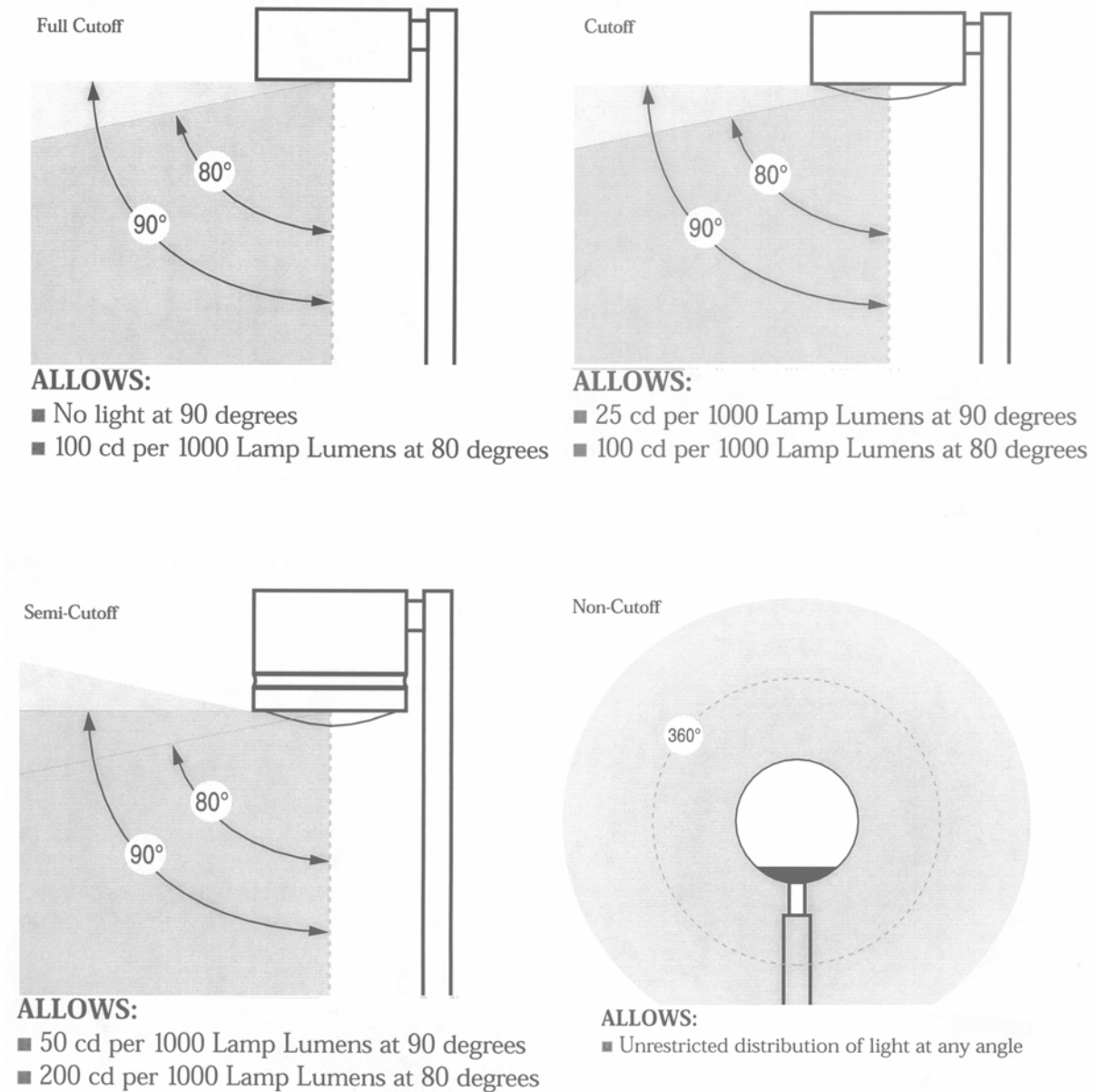
Most security lighting is overdone, with high wattage lights burning from sundown to sunup. As noted earlier, constant levels of illumination tend to be largely ignored because they are commonplace, and they waste a huge amount of energy. The large amount of glare produced by high intensity sources creates shadows that provide hiding places for intruders. Moreover, the constant glare and light trespass onto adjacent properties is a major source of annoyance to their occupants. On the other hand, lights that are activated by motion within a controlled area attract immediate attention and, at the same time, use very little energy and create intrusion on adjacent properties only when such attention is desired. For example, if one is using 300 watts of security lighting for ten hours each night and converts to an infrared motion sensor control that turns on the lights only when there is motion in the controlled area, energy cost is reduced to almost nil. In addition, the cost of the added sensor-control hardware itself can be recovered in as little as two months due to the energy saving. At the same time, security is increased rather than decreased, and glare and light trespass onto adjacent properties is virtually eliminated.

Glare is a significant and pervasive problem, but one that is easily solved by installing fully shielded light fixtures.

Light-trespass is a term of relatively recent origin and denotes: (1) glare that is generated by sources on one property that lie within the normal field of view of the occupants of another property; and (2) light that spills over the boundaries of one property onto another, thereby producing unwanted illumination of it. Increasingly, such light intrusions are being regarded as trespass violations every bit as serious as physical trespass of a person onto the property of another. Such problems can now be readily avoided by the selection of proper fixtures, the selection of proper intensity levels, and the use of timers and sensors/controllers. This is an area where an enhanced and updated County ordinance is badly needed.

Sky-glow is also readily addressed by the selection of properly designed modern fixtures for new installations and by the phased retrofitting of current inadequate installations. The cost of such retrofits is normally recoverable within a reasonable time period (usually estimated at about three years) through efficiently placing all of the light onto the desired area and the lower energy usage.

Figure VII-1
Effects of Cut-off and Non Cut-off Luminaires



(Sources: Paulin, Douglas, *Full Cutoff Lighting: The Benefits*, IESNA web site, and Shaflik, Carl, *Environmental Effects of Roadway Lighting*, Information Sheet Number 125, International Dark-Sky Association, Tucson, Arizona, August 1997.)

Adherence to the following four principles will do much to mitigate or eliminate light pollution.

- a. Always illuminate with properly shielded fixtures that prevent the light source itself, and the resultant glare, from entering your field of view. This is done by using cutoff fixtures or supplementary shielding that keeps all of the illumination below the horizontal plane.
- b. Do not over-illuminate. Never use more illumination than needed for the task at hand. Using a 400 watt floodlight to illuminate a small parking area or a flag at night is overkill and wastes a great deal of energy. A properly shielded and adjusted 250 watt luminaire (light source + fixture) can illuminate an area just as effectively as an older style 1,000 watt light source.
- c. Always aim lighting downward, keeping all of its distribution within the property lines and below the horizontal plane so that it is not a source of glare. Light trespassing onto adjacent properties is unnecessary, inconsiderate, and potentially illegal.
- d. Do not burn lighting all night long with the intention of improving security. Using infrared motion sensor-controlled lighting that comes on instantly when there is motion in the designated area is far more effective as a security measure. That rapid change from dark to light draws the immediate attention of everyone in the surrounding area, including security and law enforcement personnel on patrol, and may well be unsettling enough to cause illicit intruders to flee. Lighting that stays on all night draws no special attention and is an enormous waste of energy.

5. Public Agency Responsibilities

Compliance with glare standards for residences and other private property is the responsibility of the County's zoning enforcement staff. The County has 18 zoning inspectors (two per magisterial district) to oversee all Zoning Ordinance enforcement. Any enforcement activity dealing with light is complaint-driven. During 1997, the staff received 11 light-related complaints out of a total of 2,287 complaints. The County does not respond to anonymous complaints. Complaints are either filed directly with the Zoning Enforcement Branch or are forwarded by the staff of a member of the Board of Supervisors. The causes of the complaints were usually fast food establishments, security lighting for residences, athletic facilities (e.g., ball fields, driving ranges), or churches. The zoning inspectors typically resolve violations with informal enforcement such as a verbal warning. A notice of violation or civil action can be used if needed. Beyond the general glare standards, the County frequently has been able to impose additional restrictions through the provisions of the special permit and special exception processes.

One of the most onerous sources of light pollution is the obtrusive lighting of commercial and industrial facilities, particularly commercial retail and service establishments. While their desire to attract attention to themselves is understandable, abusive excesses degrade the overall ambiance of our commercial areas and materially degrade the quality of life in adjacent residential neighborhoods. This is exacerbated by the current absence of a comprehensive and carefully drawn ordinance, especially in the areas of glare and light-trespass onto the properties of others. It is of particular concern in the case of “by-right” development where there are no public hearings (e.g., Planning Commission, Board of Zoning Appeals, or Board of Supervisors) at which adjacent property owners and neighborhoods can register their concerns and see approval conditioned on appropriate restrictions. In such “by-right” cases, the initial responsibility would necessarily fall almost entirely upon the Office of Site Development Services of the Department of Public Works and Environmental Services, which reviews all proposed plans before a building permit is issued.

At this time the County has no formal policies regarding street lighting. Some neighborhoods within the County prefer street lighting, while others do not. Whether or not the County provides street lighting is often driven by budget priorities, and unless there is a demonstrable public safety need, the priority for retrofitting a community is usually low. More often, street lighting is addressed in the overall planning of new subdivisions. In these cases, the Office of Site Development Services would have responsibilities for both reviewing the plan and inspecting the implementation of it.

Responsibility for the lighting of main roadways is under the jurisdiction of VDOT. Historically, local communities and neighborhoods have had to deal directly with VDOT over roadway lighting issues. It has proved very difficult to influence VDOT’s choice of fixtures and technical standards, even when it can be demonstrated that their proposed implementations will result in unacceptable levels of glare and light trespass in adjacent residential neighborhoods.

It should be noted that the Department of Planning and Zoning is currently reviewing a number of the things discussed and recommended in this report in the process of drafting comprehensive enhancements and revisions to the present very-limited ordinance. It is hoped that this much-improved ordinance will be ready for presentation to the Board of Supervisors for its approval early in 2002.

6. Public Education and Awareness Needs

The general public needs to be made aware of the sources and problems of light pollution and of the methods by which these can be best addressed. This can be done in two ways. First, an informative brochure should be prepared that can be made available to individuals, homeowners groups, and community associations. Brochures could be

made available through appropriate County offices and through the district offices of the members of the Board of Supervisors. Second, and perhaps more efficient, is to make the same information available through the County's web site, which has become an exemplary vehicle for distributing the latest information relating to all aspects of County governance and services.

A few jurisdictions in other areas have prepared technical brochures to make architects, contractors, and electricians aware of their lighting codes and specifically describe what their jurisdictions do not permit (e.g., unshielded security lights, angle-directed post or building mounted fixtures, wall packs without shielding or baffling, excessive wattage or unshielded floodlights, light-trespass onto other properties, etc.) and what they recommend. Fairfax County should prepare a brochure of this type to coincide with the introduction of a new ordinance so that the development and contractor communities will be fully aware from the outset of the revised standards and how best to address them.

7. Conclusions

The principal means to prevent poor exterior lighting practices is a comprehensive code or ordinance, because this provides an enforceable legal restriction on specific lighting practices that are deemed unacceptable to the community and its quality of life. Numerous jurisdictions have adopted codes and ordinances that have proven very effective in reducing light pollution and preventing light trespass. A properly conceived and well written code will permit all forms of necessary illumination at reasonable intensities, but will require shielding and other measures to prevent light pollution and light trespass. A good code will apply to all forms of outdoor lighting, including streets, highways, and exterior signs, as well as lighting on dwellings, commercial and industrial buildings, parking areas, and construction sites. A good code will also provide for reasonable exceptions for special uses within acceptable time periods and subject to effective standards.

The County needs to work closely with VDOT to achieve better lighting practices on roadways within Fairfax County that are under VDOT jurisdiction. Current VDOT lighting and proposed new installations are regarded as being very intrusive by adjacent neighborhoods.

Much of the security lighting in Fairfax County is poorly conceived, excessive in intensity, and improperly directed and controlled. These deficiencies could be corrected at relatively low initial costs that would be rapidly recovered through energy savings.

Much lighting in residential neighborhoods uses old style fixtures that propagate light trespass into adjacent properties. A new comprehensive code and public awareness campaign could go far toward correcting these problems.

Poor lighting design, particularly in commercial areas, is contributing to excessive and highly objectionable sky-glow. A new code and retrofitting or adjustment of fixtures could eliminate the worst of this effect.

C. VISUAL POLLUTION

EQAC is not reporting on visual pollution issues this year. EQAC reiterates its recommendations from the 2000 Annual Report on the Environment, noting that the newly formed Countywide Sign Task Force will be addressing these recommendations.

D. RECOMMENDATIONS

Noise

1. EQAC recommends that the Board of Supervisors continue to monitor the TRACON project in order to ascertain whether changes in airspace redesign will have a negative impact on Fairfax County.
2. EQAC recommends that the Board of Supervisors investigate and establish zoning and noise requirements to insure that the possibility of commercial helicopter service in Fairfax County does not result in an intolerable rise in aircraft noise and citizen annoyance levels. It appears that the current regulatory framework for helicopters is either inadequate or non-existent. EQAC further recommends that the Fairfax County continue to participate in the CONANDA Helicopter Noise Working Group with the goal of identifying and mitigating the impact of all helicopter noise on Fairfax County citizens.
3. EQAC recommends that the Board of Supervisors closely track and continue to participate in the update of the Noise Compatibility Study for Ronald Reagan Washington National Airport in accordance with the provisions of FAR Part 150. EQAC notes that the Board of Supervisors initially addressed this recommendation in its June 11, 2001 action in appointing Supervisor Hyland to the Part 150 Advisory Committee. EQAC recommends that Fairfax County participate in all levels of committees and subcommittees associated with this study.

Light Pollution

4. EQAC recommends that the Board of Supervisors direct the Department of Planning and Zoning to move with all deliberate speed in developing a comprehensive ordinance to address lighting standards and practices in Fairfax County and the problems of light pollution.
5. EQAC recommends that the Board of Supervisors direct that all future exterior lighting fixtures installed in Fairfax County follow the recommendation of the Illuminating Engineering Society of North America that most lighting fixtures direct all light below the horizontal plane.
6. EQAC recommends that the Board of Supervisors direct that all older lighting fixtures under County control that do not meet the above standard be replaced on a phased basis with these newer recommended fixtures. EQAC notes that these steps will lead to significantly lower energy costs that will recoup the costs of the changeover in a reasonable period of time.
7. EQAC recommends that the Board of Supervisors work with VDOT and Virginia elected officials to replace existing fixtures on our roadways (under the control of VDOT) with the same type of fixtures recommended in recommendation #6.
8. EQAC recommends that the Board of Supervisors direct the County staff to prepare both a printed brochure and an item on the County web site to promote public awareness of issues, problems, and solutions connected with illumination and light pollution. EQAC further recommends that the Board of Supervisors direct that a technical brochure be prepared for the education of architects, contractors, electricians, and builders as to what the County permits and does not permit in the field of illumination. Both of the above items should be made available at the time a comprehensive illumination ordinance is adopted by the Board.

Visual Pollution

9. EQAC recommends that the Board of Supervisors immediately negotiate and execute a similar agreement to that of Prince William County with VDOT such that VDOT would delegate enforcement authority, including penalties, to the County regarding illegal signs in VDOT rights of way. Preliminary steps such as a public hearing may be needed.
10. EQAC recommends that the Board of Supervisors use a multimedia approach to make citizens aware of Title 48 (Virginia's nuisance statute), as has been done in Loudoun County, and to advise and enlist the cooperation of the Fairfax County Commonwealth Attorney's Office.

11. EQAC repeats its recommendation from 1999 that the Board of Supervisors authorize the use of trained and certified volunteers to remove illegal signs from public property or the right-of-way. The volunteers would be certified by magisterial district and display appropriate identification. This would require approval from VDOT using its Adopt-a-Highway authority.
12. EQAC repeats its recommendation that the Board of Supervisors request the Commonwealth Attorney's Office and the Virginia courts to sentence more non-violent offenders to community service to assist in litter and illegal sign removal. In turn, the Board of Supervisors should request the Sheriff's Department to expand the existing community services program to collect and dispose of illegal signs.
13. EQAC repeats its recommendation that the Board of Supervisors authorize the hiring of additional employees to address illegal signs in conjunction with a new County/VDOT agreement as noted above. A high priority should be given to this effort. To this end, a more enforcement-oriented posture needs to be used to create more deterrence among advertisers. This should include maximum use of the \$100 per sign authority, full reimbursement for removal actions, prosecution of repeat offenders, and active use of the media to make clear that such a practice will not be tolerated. As part of this, the Zoning Enforcement Branch should begin to document all activities on a quarterly basis by magisterial district.

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International Dark-Sky Association web site, <http://www.darksky.org/>

National Electrical Manufacturers Association web site, <http://www.nema.org/>. (Particularly see their White Paper on Outdoor Lighting Code Issues.)

Virginia Outdoor Lighting Taskforce (VOLT) web site, <http://www.volt.org/>